REMARKS

Claim 1 relates to a vulcanized rubber compound based on diene rubbers and customary additives, which are characterized in that the vulcanizing system contained in the compounds comprises 0.5 to 3.8 parts by weight of compound (I) R_2N-(C=S)-S-S-$(CH_2)_x$-S-S-(C=S)-NR_2 where R=($C_6H_5CH_2$) and X=6; 0.5 to 2 parts by weight sulfur and; 0.5 to 3.0 parts by weight of vulcanization accelerators, wherein the parts by weight are given in each case with respect to the use of 100 parts by weight of rubber. Claims 2-5 are dependent on Claim 1 and further specify the compound's components. Claim 6 claims rubber moldings which are comprised of the vulcanized rubber compounds disclosed in Claims 1-5. Claims 7-10 are dependent on Claim 6 and further specify the rubber moldings which are comprised of the vulcanized rubber compounds. Claim 11 claims the rubber moldings of Claim 6 wherein the rubber molding is a molding for a tire component.

I. Rejection under 35 U.S.C. 102 (a or b) or 35 U.S.C 103 (a)

The Examiner has rejected Claims 1-11 under 35 U.S.C. 102 (a or b) as anticipated by or, in the alternative, under 35 U.S.C. 103 (a) as obvious over Chauvin, et al. (EP 695 780).

The Applicants respectfully submit that, unlike the present invention, Chauvin, et al. does not disclose the crosslinker of compound I. In particular, the crosslinker 1,6-bis(N,N-dibenzylthiocarbamolydithio)-hexane (hereinafter, NDT) is not disclosed in Chauvin, et al., nor are bis(N,N-dibenzylthiocarbamoyldithio)alkanes.

II. Rejections under 35 U.S.C. 103 (a)

The Examiner has rejected Claims 1-11 under 35 U.S.C. 103 (a) as obvious over Trivette (USPN 3,979,369), DN 120:10211 (Wolpers, et al.: USPN 5,342,900) and DN 122: 135730 (Nordsiek, et al., Kautschuk Gummi Kunststoffe 47, 5 (1994) 319-324). The Examiner states that Trivette, Wolpers, et al., and Nordsiek, et al. disclose a vulcanization system similar to the one in the present invention.

Trivette

The Examiner indicates that Trivette discloses a large list of compounds and that the present invention's claimed vulcanizing system is suggested, including the compound (I) and the appropriate range of sulfur.

Trivette discusses the use of compounds of the general formula A-S-S-R-S-S-A' for the vulcanization of rubbers, wherein R contains almost any divalent organic radical, and A and A' contains a very large number of accelerator radicals. However, contrary to the Examiner's assertions, the Applicants respectfully submit that the claimed compound (I), in particular, the compound 1,6-bis(N,N-dibenzylthio-carbamolydithio)-hexane (NDT) is not disclosed or suggested in Trivette. Trivette does not disclose or suggest the technological profile of vulcanized rubber compounds containing NDT as the cross-linker.

The present invention relates to vulcanizable diene rubber compounds which exhibit a high capacity for the addition of sulfur to be varied **while processing safety is maintained**, for the production of **improved rubber moldings, particularly tire components**. The vulcanizates of the present invention have excellent processing safety in terms of the Mooney scorch time, an improved modulus, an improved resistance to tear propagation, and an excellent resistance with respect to reversion. From Trivette's general teaching, it is not possible to determine how one of ordinary skill in the art can improve the modulus, the resistance to tear propagation and the reversion resistance without sacrificing processing safety. For example, Trivette discloses that the crosslinking agents of the formula A-S-S-R-S-S-R' can be used on their own or can be used with sulfur and vulcanization accelerators (column 25, lines 15-19). The amount of elemental sulfur, if present, preferably falls within the range from 0.5 to 1.5 parts by weight of sulfur with respect to 100 parts by weight rubber (column 25, lines 19-24). However, Trivette goes on to explain that increasing the amount of sulfur reduces the processing safety, increases the cure rate, and results in greater reversion resistance (column 46, lines 13-20). In addition, Trivette discloses that the presence of an accelerator reduces processing safety but enhances the cure rate and the state of cure (column 46, lines 63-65).

Although the present invention claims use of between 0.5 to 2 parts by weight sulfur, the use of the combination of NDT, sulfur, and an accelerator is an improvement over the prior art. **Not only is processing safety improved but so is the modulus, the resistance to tear propagation and the resistance with respect to reversion**. Trivette tends to diverge from the present invention. The

Applicants respectfully submit that Trivette teaches away from the presently claimed invention and is, therefore, nonobvious.

Nordsiek, et al. and Wolpers, et al.

Nordsiek, et al. describes a rubber vulcanization using NDT on its own or in combination with sulfur. If sulfur is used, the maximum sulfur loading is 0.2 parts by weight. For an ordinary person skilled in this art, this sulfur loading is not proximate, but far away from the claimed sulfur loading of 0.5 to 2.0 parts by weight of the presently claimed invention. Trivette discloses a deterioration of the level of processing safety at a sulfur loading of 1.0 parts by weight or more. Thus, it is absurd to assume that a person skilled in the art would increase the sulfur level in small increments above 1.0 parts by weight in order to *improve* a vulcanizate with respect to whatever property, if best processing safety is an indispensable property of the compound. Consequently, Nordsiek, et al. in view of Trivette, teaches away from the present invention. Moreover, at no point does Nordsiek, et al. mention or suggest the goal of the presently claimed invention, namely to provide rubber compositions at sulfur levels above 0.2 parts by weight, which yield compounds with high processing safety, and rubber compounds having improved modulus and greater resistance to tear.

Similarly, Wolpers, et al. discloses a method of producing vulcanized rubber materials with a crosslinking system consisting of 1 to 4.5 parts by weight of NDT, 0.05 to 0.3 parts by weight of sulfur (preferably 0.1 to 0.2 parts by weight of sulfur) and selected types of accelerators with selected loadings. As discussed above, the present invention claims a significantly higher range of 0.5 to 2.0 parts by weight of sulfur. As stated above, in view of Trivette, it appears that those skilled in the art would assume that, by raising the parts by weight of sulfur, the level of processing safety would decrease. Therefore, it would not be obvious to those skilled in the art to increase the amount of sulfur in order to improve rubber compositions. As in Nordsiek, et al., Wolpers, et al. is silent about providing rubber compositions with high processing safety, an improved modulus, and greater resistance to tear.

Accordingly, the Applicants respectfully submit that the presently claimed invention is neither disclosed nor suggested by Wolpers, et al. or Nordsiek, et al.

Chauvin, et al.,Trivette, Nordsiek, et al., and Wolpers, et al. teach away from the presently claimed invention, namely to use a special crosslinking agent, relatively high amounts of sulfur and specific amounts of vulcanizing accelerators. Only when the presently claimed compound NDT is combined with 0.5 to 2 parts by weight of sulfur and 0.3 to 3.0 parts by weight of at least one vulcanization accelerator will one obtain vulcanizable rubber compounds with high processing safety yielding vulcanizates with an excellent (unexpectedly improved) technological profile.

For any and all of the aforementioned reasons, reconsideration and early allowance of Claims 1-11 is courteously requested.

Respectfully submitted,

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